

## EFFECT OF FOLIAR APPLICATION OF PANCHAGAVYA AND LEAF EXTRACTS OF ENDEMIC PLANTS ON GROUNDNUT (*ARACHIS HYPOGAEA* L.)

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### ABSTRACT

The present study was aimed to improve the growth and yield of groundnut (*Arachis hypogaea* L.) under foliar spray of panchagavya and leaf extracts as organic source of nutrient. The experiment was conducted during *Kharib 2010*. The results revealed that foliar application of panchagavya + leaf extract of neem recorded significantly higher number of nodules, number of pods per plant, pod weight per plant, pod yield, haulm yield and harvest index as compared to other treatments. Panchagavya + leaf extracts of neem recorded significantly higher 100 kernels weight, shelling per cent, nutrient uptake of N and P, oil content over other sources. Foliar application of panchagavya with leaf extract of plants both at branching and flowering stages was found most effective with respect to nutrient uptake of N and P kernels and haulms as compared to single application either at branching or flowering stage.

**Key words:** Custard apple, Glyricidia, Groundnut, Leaf extract, Neem, Oak, Panchagavya, Quality, Uptake, Yield.

Groundnut (*Arachis hypogaea* L.) is one of the important oil seed crop of India growing in an area of 5.95 million hectares with production of 7.54 million tonnes in (Anonymous, 2010-2011). China, U.S.A., West Africa, Sudan, Nigeria, etc. Oilseed crops have a specific place in Indian agriculture because edible oil is the next to food grain in Indian diet. Oilseed crops have a vital role in Indian agriculture industry and export trade and thus in the economy of the country. Organic farming in recent years is gaining impetus due to realization of inherent advantages as it confers in sustaining crop production and also in maintaining dynamic soil nutrient status and safe environment (Lokanath and Parameshwarappa, 2006). Panchagavya, an organic product has potential to play the role in promoting growth and providing immunity in plant system. The use of organic liquid such as panchagavya results in higher growth, yield, and quality of crops. Different species of insect pests were reported to be associated with groundnut in different required of the country.

Usually the management the pests is insecticide oriented, but the problems associated with synthetic chemicals viz. development of pest resistance objectionable pesticide residue and higher cost etc, has necessitated development of new control methods. Several plants and its product are known to be potential resources. The present study leaf extracts of different plants were associated with panchagavya.

A field experiment was conducted at Agronomy instructional Farm, C. P. College of Agriculture, Sardarkrushinagar Dantiwada Agricultural University, S.K. Nagar during *kharif 2010*. The soil of experimental field was loamy sand in texture. The field experiment was laid out in a factorial randomized block design (FRBD) with 18 treatment combinations comprised of six sources of foliar application and three stages of application having three replications. The leaf extract of four commonly available plants, viz., neem, oak, glyricidia and custard apple along with panchagavya

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and control (water spray) were used as sources of foliar application. These sources of foliar application were applied either at branching or flowering and both at branching plus flowering stages. Panchagavya solution was prepared by thorough mixing of fresh cow dung (5 kg), cow-ghee (butter oil, 0.5 kg), fresh cow urine (3 L), cow milk (2 L), cow curd (2 l), jaggery (500 gram) and coconut water (2 l). The leaf extracts of neem, oak, glyricidia and custard apple were prepared by mixing fresh leaves with cow urine in 1:1 ratio followed by fermentation. The filtrates of leaf extracts were mixed with the filtered panchagavya solution in 1:1 ratio for respective leaf extracts. Recommended dose of N, P, and K along with FYM @ 10 t / ha was applied uniformly in all the treatments before sowing of crop. After a pre sowing irrigation, the groundnut, variety GG2 in rows 45 cm apart using 100 kg seed / ha on June 24, 2010 and harvested on October 21, 2010. The seeds were treated with *Trichoderma viride* (6 g/ kg seed) as prophylactic measure against seed borne disease and metarazine (10 g/ kg seed) measure as bio insecticide. The initially prepared and filtered solution of panchagavya and leaf extract were diluted with water and applied on the crop foliage as per treatment.

**Growth Parameters:** The growth parameter viz, number of nodules was recorded significantly higher

under application of foliar spray of panchagavya plus neem leaf extract followed by treatment panchagavya plus glyricidia leaf extract (Table 1). On an average, application of foliar spray of panchagavya plus neem leaf extract increase number of nodules by 31% over control. Significantly higher number of nodules (85.32) was recorded with the application of panchagavya + neem leaf extract over other treatments, but it was at par with panchagavya + glyricidia leaf extract in case of number of nodules. These growth parameter of number of nodules was also increased significantly with foliar application of different sources at both stages of branching and flowering as compared to either at branching or at flowering. The higher root nodule weight foliar sources in the study were attributes to increase plant growth and translocation of carbohydrates to developing nodules. Foliar application of different leaf extracts both at branching and flowering stage recorded significantly higher number of nodules as compare to single application either at branching or flowering stage. Similar results were also reported by Kumawat *et al.* (2009). Increased root nodules might be due to the growth enzymes present in panchagavya which favoured rapid cell division and multiplication was reported by Patil *et al.* (2012).

**Yield parameters and yield:** The number of pods per plant (22.41), pod weight (11.63 g plant<sup>-1</sup>), pod

TABLE 1: Number of nodules , number of pods per plant, pod weight, pod yield, haulm yield, harvest index ,100 kernels weight and shelling % of groundnut as influenced by foliar application panchagavya and leaf extract of endemic plants.

Treatments	Number of nodules At 50 DAS	Number of pod plant-1	Pod weight plant-1 (g)	Pod yield (kg ha-1)	Haulm yield (kg ha-1)	Harvest Index (%)	100 kernels Weight (g)	Shelling%
<b>Foliar applied source</b>								
Control	65.13	17.02	9.34	1225	2386	33.92	32.72	63.55
Panchagavya	72.77	18.21	9.96	1616	2851	36.18	37.18	65.29
Panchagavya + neem	85.32	22.41	11.63	2298	3665	38.53	41.98	70.09
Panchagavya + oak	77.79	20.73	10.73	2051	3481	37.07	39.54	69.48
Panchagavya + glyricidia	81.65	21.17	11.02	2160	3557	37.79	40.07	68.77
Panchagavya + custard apple	78.82	18.84	10.33	1926	3292	36.91	39.03	67.38
S.E.m. ±	1.81	0.59	0.35	51.14	88.75	0.93	0.95	1.74
C. D. (P= 0.05)	5.22	1.70	1.01	147	255	2.67	2.74	5.00
<b>Stage of foliar application</b>								
Branching	75.68	19.79	10.61	1897	3236	37.12	38.81	68.31
Flowering	71.95	18.93	10.01	1804	3077	34.67	37.02	65.04
Branching + flowering	83.12	20.48	10.89	1937	3303	38.40	39.43	69.43
S.E.m. ±	1.28	0.42	0.25	36.16	62.05	0.66	0.67	1.23
C. D. (P= 0.05)	3.69	1.20	0.72	104	180	1.89	1.94	3.53
Interaction	NS	NS	NS	NS	NS	NS	NS	NS
C. V. (%)	7.08	8.98	10.07	8.16	8.31	7.59	7.45	7.72

yield (2298 kg ha<sup>-1</sup>), haulm yield (3665 kg ha<sup>-1</sup>), harvest index (38.53), 100 kernels weight (41.98 g) and shelling percentage (70.09 %) were recorded significantly higher with Panchagavya + neem leaf extract spray (Table 2). However, it was statically at par with Panchagavya + glyricidia and Panchagavya + oak leaf extract in case of number of pods per plant, pod weight and kernel weight, at par with Panchagavya + glyricidia in case of pod and haulm yield and at par with all organic sources in case of harvest index and shelling percent. Application of panchagavya + neem leaf extract spray increased number of pods per plant, pod weight, pod yield, haulm yield, harvest index, 100 kernels weight and shelling percentage by 32.0, 25.0, 87.0, 53.0, 14.0, 28.0 and 10 percent over control. Foliar spray of different leaf extract and panchagavya both at branching and flowering stage recorded significantly higher number of pods per plant, pod weight, pod yield, haulm yield, harvest, 100 kernels weight and shelling percentage over single spray at flowering stage. On an average, foliar spray both at branching + flowering stage recorded 8.0, 9.0, 7.0, 7.0, 11.0, 7, and 6.0 per cent higher number of pods/ plant, pod wt, pod yield, haulm yield, harvest index, 100 kernels weight and shelling percentage over spray at flowering alone. Similarly increased pod intensity per plant with application of neem leaf extract was reported in cowpea. Smaller quantities of IAA and GA present in panchagavya when foliar sprayed could have created stimuli in the plant system which

in turn increased the production of growth regulator in cell system and the action of growth regulators in plant system stimulated the necessary growth and development, leading to better yield. Yadav *et al.* (2006a and 2006b) reported increased yield of crop plants with panchagavya application due to enhancement in the biological efficiency of crop plants. The maximum improvement in grain and biological yield with all the foliar sources might be associated with increased yield attributes due to concomitant increase in dry matter accumulation, chlorophyll content, nitrate reductase activity and supply of all the plant nutrients (Kumawat *et al.*, 2009). Higher shelling % might be due to higher test weight observed under foliar spray of Panchagavya and leaf extract treatments.

**Quality parameters:** Oil content was not found significantly influenced by different foliar spray treatments. However, panchagavya + neem leaf extract produced maximum oil (49.0 %) followed by treatments panchagavya + glyricidia (48.7 %), panchagavya + oak (47.7 %) and panchagavya + custard apple leaf extract spray (47.4) and panchagavya alone (47.2 %).

**Nutrient uptake:** Panchagavya + neem leaf extract quanted for maximum uptake of Nitrogen by kernels (75.40) and haulm (65.80 kg/ ha) which were significantly higher than other treatments (Table 2). The nitrogen uptake in kernels and haulm was significantly increased by 80.81 and 62.66 percent

TABLE 2: Protein content, oil content, nitrogen and phosphorus uptake by kernels and haulm of groundnut as influenced by foliar application panchagavya and leaf extract of endemic plants.

Treatment	Oil content (%)	Nitrogen uptake (kg ha <sup>-1</sup> )		Phosphorus uptake (kg ha <sup>-1</sup> )	
		Kernels	Haulm	Kernels	Haulm
<b>Foliar applied source</b>					
Control	47.09	41.70	40.45	6.40	4.10
Panchagavya	47.18	46.50	53.25	7.05	4.78
Panchagavya + neem	49.01	75.40	65.80	11.48	7.55
Panchagavya + oak	47.75	60.55	56.05	9.65	5.90
Panchagavya + glyricidia	48.71	62.30	59.25	9.67	6.34
Panchagavya+ custard apple	47.40	57.53	54.70	8.23	5.45
S.E.m. ±	0.60	1.39	1.34	0.30	0.19
C. D. (P= 0.05)	NS	3.98	3.84	0.87	0.56
<b>Stage of foliar application</b>					
Branching	48.38	57.87	55.45	8.83	5.74
Flowering	47.26	54.41	50.54	7.91	5.22
Branching + Flowering	47.93	59.72	58.76	9.50	6.10
S.E.m. ±	0.43	0.98	0.95	0.21	0.14
C. D. (P= 0.05)	NS	2.81	2.72	0.61	0.40
Interaction	NS	NS	NS	NS	NS
C. V. (%)	3.79	7.25	7.31	10.33	10.29

with panchagavya + neem leaf extract spray over control. Significantly higher nitrogen uptake by kernels ( $59.72 \text{ kg ha}^{-1}$ ) and haulm ( $58.76 \text{ kg ha}^{-1}$ ) was recorded with foliar application both at branching + flowering over single application at flowering in case of kernels, while foliar leaf extract with panchagavya application of both at branching+ flowering stage over single application either at branching or flowering in case of haulm. The cow urine rich in uric acid, a source of nitrogen was readily soluble and liquid form, one of the important compounds in panchagavya and was readily available to the plants directly influencing the nitrogen content of leaves. Panchagavya eliminates the imbalances in physical, chemical and biological processes due to the cosmic energy produced by stirring of the stock solution. Significantly higher phosphorus uptake in kernels ( $11.48 \text{ kg ha}^{-1}$ ) and haulm ( $7.55 \text{ kg ha}^{-1}$ ) was recorded by the application of panchagavya + neem leaf extract over rest of the treatments. Phosphorus uptake by kernels and haulm was increased by 79.37 and 84.14 per cent with

panchagavya + neem leaf extract over control. Significantly maximum phosphorus uptake in kernels ( $9.50 \text{ kg ha}^{-1}$ ) and haulm ( $6.10 \text{ kg ha}^{-1}$ ) was recorded with foliar application of leaf extract with panchagavya both at branching and flowering stage over single application either at branching or flowering, but it was at par with single application at branching in case of haulm. The content and uptake of N and P in different plant parts was also affected significantly with stages of foliar application. The increased supply of plant nutrients with sources of foliar application in plant available form might have increased the accumulation of dry matter concomitantly by affecting the ramification of roots favourably. The increased dry matter in above ground parts favours translocation of more carbohydrate towards developing roots as reported by Kumawat (2009).

Application of foliar spray of panchagavya + neem leaf extract at branching and flowering stage is found to be the best for increasing yield and quality of groundnut.

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